When to Prune Southern Pine

By Benson H. Paul

Senior Silviculturist, Forest Products Laboratory, Forest Service, U. S. Department of Agriculture

The conditions under which second-growth stands of Southern pine originate usually determine whether or not pruning is desirable or necessary. Understocking of stands during their initial stages of development necessitates early pruning because there is not enough shade to kill the lower branches, with the result that only very knotty lumber will be produced.

In well-stocked stands, shaded lateral branches of the Southern pines die when the branches are 7 to 9 years of age after which they decay and fall to the ground. The length of time dead branches cling to the tree varies greatly and must be taken into account when considering the need of pruning.

Persistence of Dead Branches

A recent study of knots at the Forest Products Laboratory showed that, in well-stocked stands, dead branches of the Southern pines persisted on the tree for an average of 12 years in shortleaf, eight years in loblolly, and six years in longleaf and slash (Fig. 1). Individual instances were found, however, when dead branches had persisted as long as 49 years in second-growth loblolly, 41 years in second-growth shortleaf, 20 years in second-growth slash, and 17 years in second-growth longleaf. The length of time elapsing between the death of a branch and its final sloughing off appeared to depend neither on the age of the branch nor on its diameter (Figs. 2 and 3). Younger and thinner branches (less than one-half inch in diameter) actually persisted as long as did older branches of greater diameters, and in some cases even longer.

Forest conditions that maintain a high humidity in the stand during warm weather promote the shedding of dead branches by keeping the wood in a moist condition favorable for decay. In closely stocked stands, the dead branches do not dry out readily, particularly if some broadleaved species are present. Conditions that favor rapid drying of small branches reduce their susceptibility to decay and prolong their existence.

The knot zones of a typical loblolly pine tree from a fully stocked stand are illustrated in Figure 4. The inner zone known as the tight, or intergrown knot zone, is formed while lateral branches are alive. Next is the loose, or black knot zone, which develops after the lateral branches die but before they break off close to the trunk and are overgrown. The outer zone consists of clear wood. By pruning before the lateral branches die, clear wood could be made to take the place of part of the tight knot zone and all of the loose knot zone.

Evils of Under-stocking

However, as already stated, in considering the need of pruning the Southern pines, it is not the dead branches or even the living branches of the well-stocked stands that require immediate attention so much as it is the removal of the living branches in understocked stands. At present under-stocking is without doubt the most serious fault in the condition of second-growth Southern pine stands. Understocking results in rapid initial diameter growth which produces trees with much taper and a high proportion of sapwood. It also permits the development of thick lateral branches low down on the trunk (Fig. 5). Such branches may persist until the trees are of merchantable size. The result is a tree of the "wolf" type which

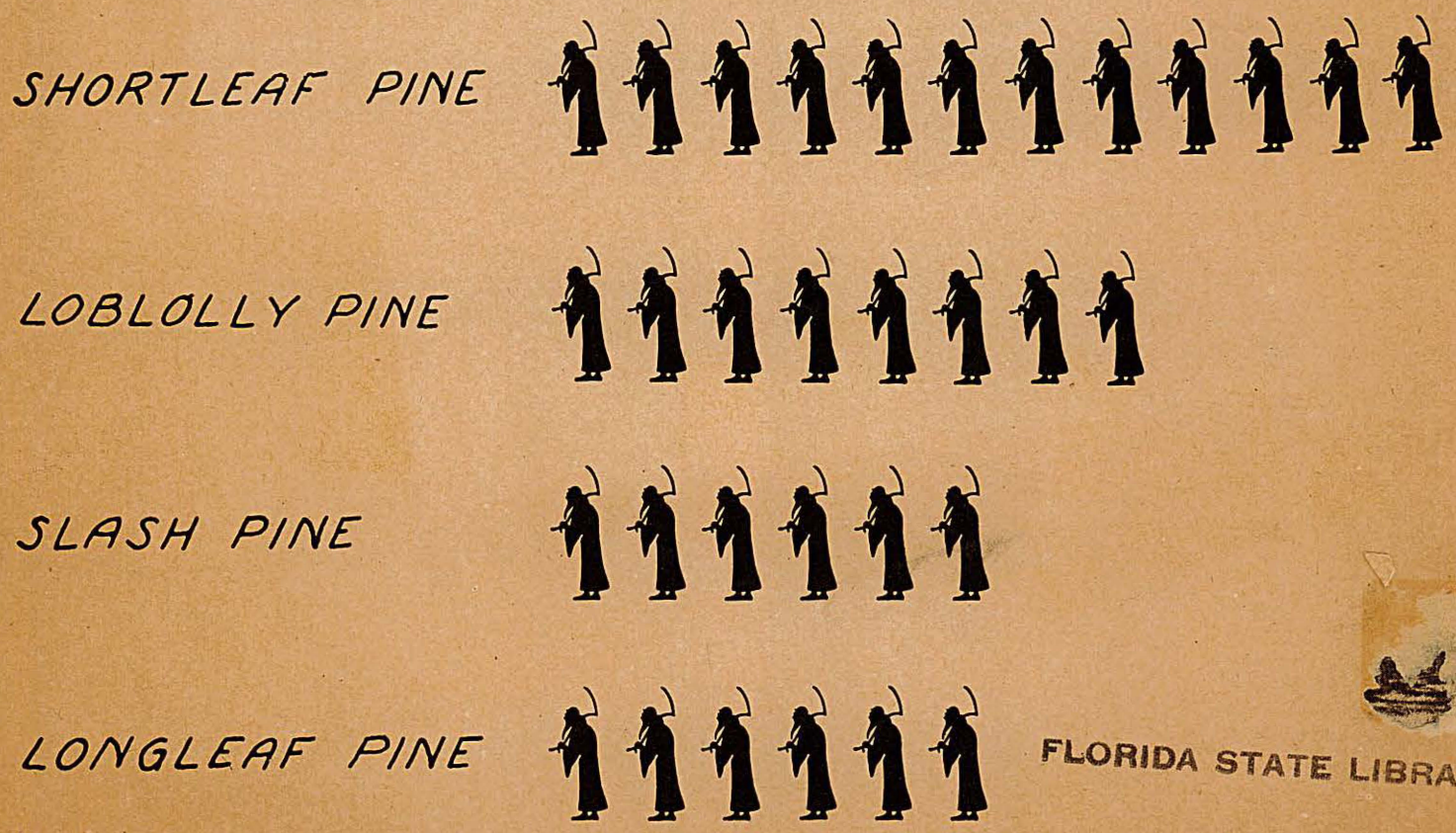

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FIGURE 1.—Average number of years dead branches or stubs persisted on the tree and produced encased knots. (Each symbol represents one year.)

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occupies a large area of ground but will produce only inferior lumber. In the trunks of such trees the knot zones extend to the bark and the clear wood zone is entirely lacking.

It is when unevenly stocked second-growth stands of this kind are becoming established that recourse to pruning is most important. Already in many second-growth stands the trees have become so large that pruning cannot be recommended because of the great expense of cutting large limbs, small returns in clear lumber, and the added danger of fungus infection in wounds after removal of limbs containing heartwood. In the younger stands now gradually developing on cutover lands or on unused farm lands, however, the pruning of young trees up to 200 per acre when not more than 3 or 4 inches diameter breast high is urgently needed if the highest quality and value of the next timber crop are to be realized (Fig. 6).

For example, an analysis of the lumber cut from 4½ acres of a 42-year-old stand in Louisiana shows that pruning of the first 16-foot log when the trees were not more than 15 years of age would have resulted in an average increase in the yield of the B and Better grade from 2½ per cent to 42 per cent of the total. Again, in a second-growth North Carolina stand, pruning when the trees were only 3 inches diameter breast high would have increased the average lumber yield in the B and Better grade from 8 per cent to 33 per cent. In both stands the total value of the sawed lumber would have been increased approximately $100 per acre on account of the increased yield of the higher grades.

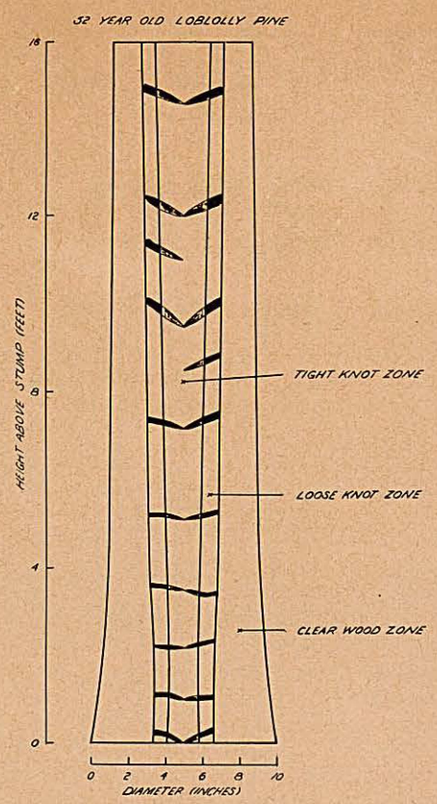

FIGURE 4.—Zones of clear wood and knots in loblolly pine.

Experience in Europe

In Europe during the past half century foresters have been relying upon very close stocking when the trees were small to eliminate lateral branches and improve timber quality. Their experience has been that, even though the branches were killed by the close spacing of the trees, the small dead branches often persisted unreasonably long, causing many black knots in such species as spruce and pine. More recently there has been a renewal of interest in forest pruning in the European nations, even though in Europe the under-stocked stand problem does not exist as in the Southern pines. In the fully stocked stands of spruce and pine certain trees are early selected and designated for pruning. Elaborate pruning rules have been worked out for different species and forest conditions. These rules specify for each species the number of trees per acre to be pruned, and the sizes of trees and branches for which pruning is allowed. The require-

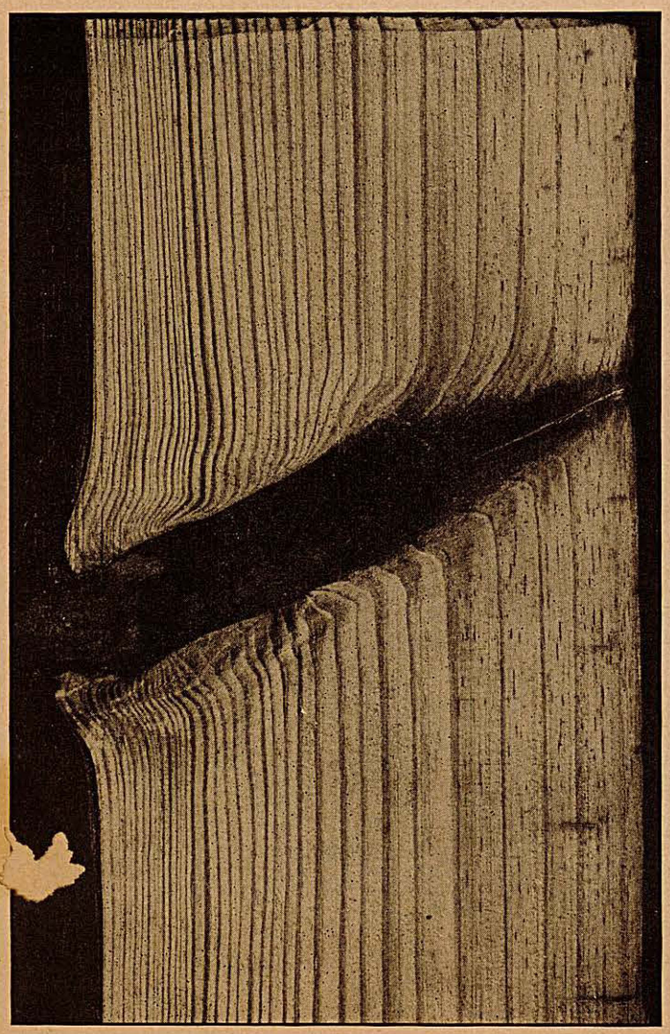

FIGURE 2.—A Small Southern pine branch which persisted on the tree for 19 years after it was dead.

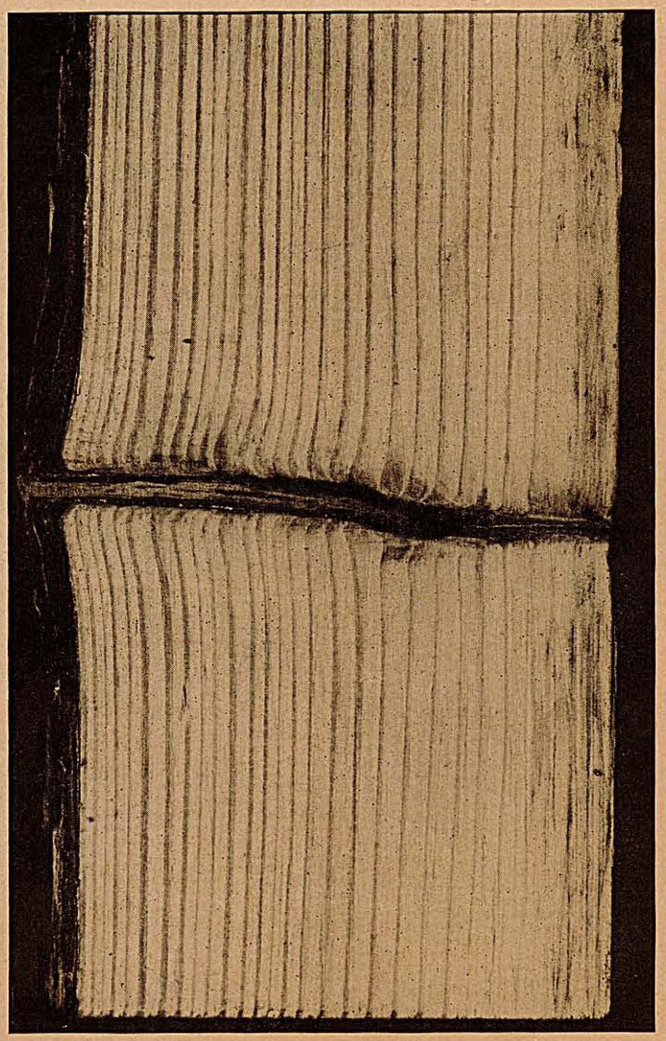

FIGURE 3.—A branch stub in shortleaf pine, dead for 25 years, but not overgrown.

ments vary according to the rate of growth of the trees and the quality of the site on which a particular species may be growing.

It must be remembered that a properly pruned tree is a guarantee of high quality second-growth timber because merchantable second growth is too young as a rule to be subject to shake and decay. Thus, even in the better stocked stands, pruning may have its advantages because pruned trees will yield more high-grade lumber at a given rotation age. It will not be necessary to wait for the natural pruning process which, as has been shown, requires an average of 6 to 12 years after the branches die and in individual cases much longer. In the business of timber growing the aim must be a maximum of high quality material if the owner is to expect the most profitable returns. If done while the branches are yet small, the cost of pruning a tree to a height of 16 feet may be as little as 5 cents or even less. Only the best trees should be pruned, preferably when they are not more than 3 inches diameter breast high and when the branches are less than 1 inch in diameter. A smooth cut should be made close to the stem; protruding stubs require longer to grow over. The exudation of pitch from sapwood in the Southern pines quickly seals the pruning wound made by removing small branches. Thrifty young pine trees will quickly close the wounds (Fig. 7).

FIGURE 7.—Rapid healing and growing over of a pruned branch stub in thirfty longleaf pine.

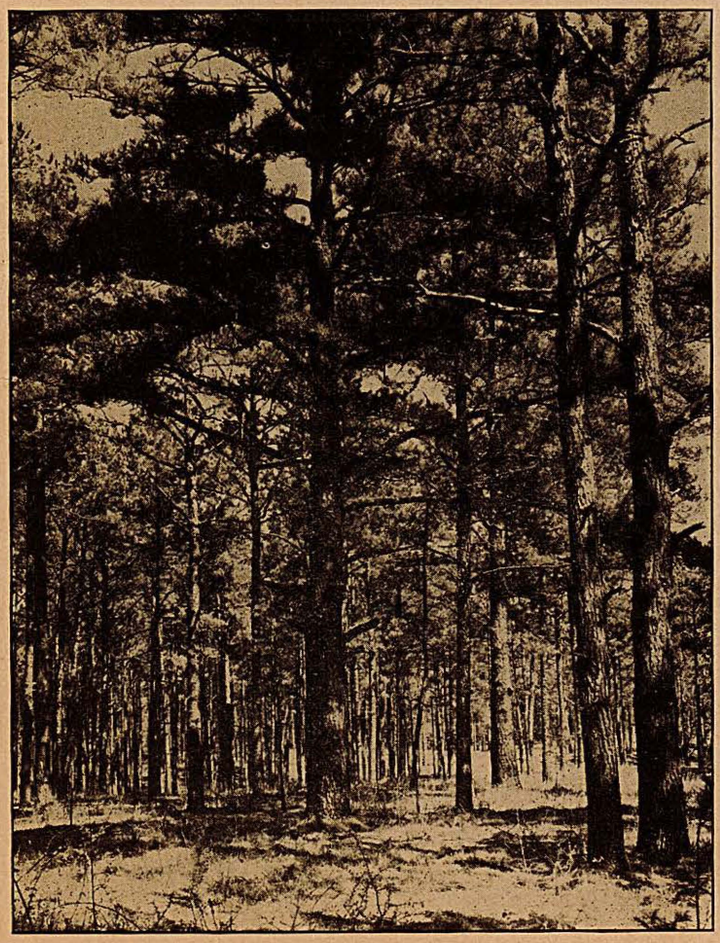

FIGURE 5.—Loblolly pine trees growing in understocked stands beyond the age for profitable pruning. Such trees will produce only low-grade lumber.

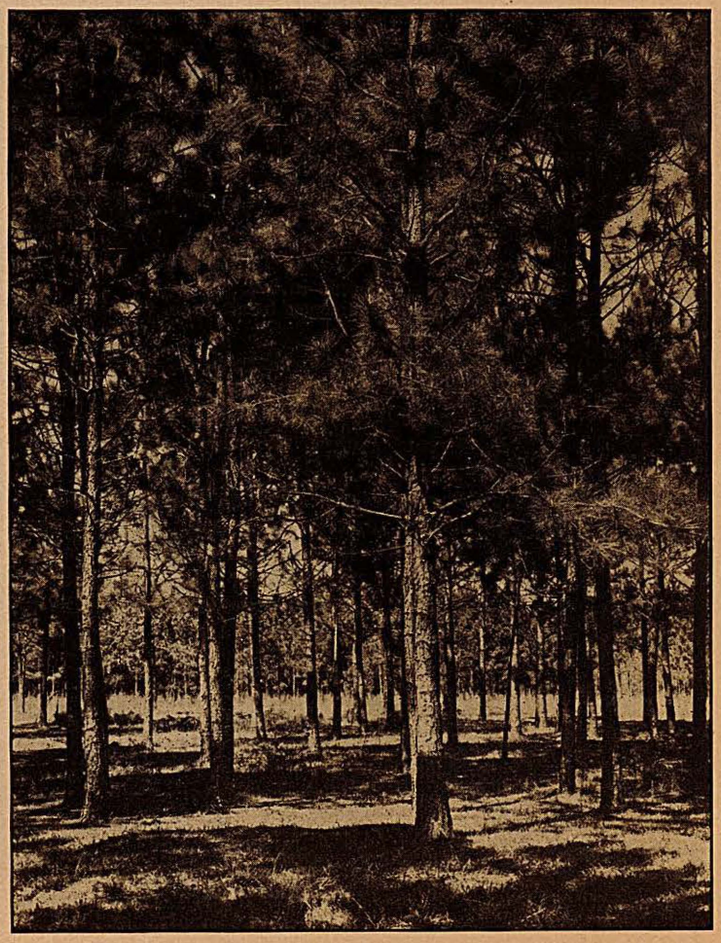

FIGURE 6.—A young understocked loblolly pine stand in immediate need of pruning if high quality lumber is to be obtained.

The Effect of Pruning Planted Slash Pine on Growth

Florida Forest and Park Service
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(By C. H. Coulter, Assistant State Forester)

To those who have planted slash pine seedlings comes the question of whether or not they should be pruned. In January, 1937, a slash pine plantation, spaced 12'x12', on Mr. C. W. Sinclair's old field land near Madison, Florida, was pruned and the trees measured to determine the diameters and heights. The same trees were remeasured in December, 1938, two full seasons after the first measurements were taken, and are as follows:

	5 years old		7 years old		Increase	
	*Ht.	**D.B.H.	Ht.	D.B.H.	Ht.	D.B.H.
Top unpruned	16.5	3.5	25.6	5.0	9.1	1.5
⅓ top pruned	16.1	3.2	24.8	4.8	8.7	1.6
½ top pruned	16.5	3.4	24.9	4.7	8.4	1.3
⅔ top pruned	16.7	3.4	24.6	4.5	7.9	1.1

*Height in feet.
**Diameters breast high (4½' above ground) in inches.

This test indicates that both diameter and height growth are reduced by pruning one-half of the top and the reduction is greater when two-thirds of the top is pruned.

Another test using bush axe, pointcut shears, and pruning saw was established in 1937. This experiment was examined two full seasons later and showed that the knots were healing over best on the saw pruned, next on the shear pruned, and poorest on those pruned with the bush axe. The bush axe was quickest but left jagged stubs. The saw was a little faster than the shears and, because it does a much better job than the axe, it is considered superior.

It is recommended that no pruning be done before the plantations are five years old and then only the lower one-third of the branches be cut off.

Caution

Both planted and volunteer stands have been observed 5 to 8 feet tall with all side branches pruned off and only the growing shoot left on the stem. This is bad practice as the young saplings need side limbs and the straw or needles on these side limbs to produce food and to make diameter and height growth.